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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 10/826,601 | 04/16/2004 | Axel Brintzinger | 2002 P 12364 US | 1197 |
| 48154 | 7590 | 10/02/2006 | EXAMINER | |
| SLATER & MATSIL LLP 17950 PRESTON ROAD SUITE 1000 DALLAS, TX 75252 | | | THAI, LUAN C | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2891 | |

DATE MAILED: 10/02/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary**Application No.**

10/826,601

Applicant(s)

BRINTZINGER ET AL.

Examiner

Luan Thai

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 July 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4, 7-17, 19-21 and 23-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 7-17, 19-21 and 23-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 July 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 7/8/04
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

This Office action is responsive to the RCE filed 7/17/06.

Claims 1-4, 7-17, 19-21 and 23-27 are pending in this application.

Claims 5-6, 18 and 22 have been cancelled.

Drawings

The newly submitted drawing (Figure 4) is objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "1" has been used to designate both the wafer and the terminal of the second apparatus. Correction is required.

Applicant is required to submit a proposed drawing correction in reply to this Office Action. However, formal correction of the noted defect can be deferred until the application is allowed by the examiner.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 2-3 and 12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 2 recites the limitation "the printed circuit board" in line 3. There is insufficient antecedent basis for this limitation in the claim.

Claim 3 recites the limitation "the lead frame" in line 3. There is insufficient antecedent basis for this limitation in the claim.

In claim 12, the phrase of "...the wafer is cooled to a temperature at which the casting compound is adequately brittle ..." is unclear. The specification does not explain at what state the casting compound is considered to be "adequately brittle" and what "a temperature" is at which the casting compound is "adequately brittle". Therefore, the claim is ambiguous as at which "temperature" is the casting compound to be considered as being "adequately brittle". Applicant should clarify this limitation.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 2, 4, 7, 13, 21 and 23-26, are rejected under 35 U.S.C. 102(e) as being anticipated by Haimerl et al. (6,897,568).

The figures and reference numbers referred to in this office action are used merely to indicate an example of a specific teaching and are not to be taken as limiting.

Regarding claims 1, 2, 7, 13, 21 and 23-26, Haimerl et al. (see specifically figures 1-5, 15, and 20-21, Col. 1, line 41 to Col. 15, line 15) disclose a method of manufacturing a module, the method comprising: providing a device (6) (e.g., semiconductor wafer, Col. 10, lines 7+) that includes a connection area comprising a compliant 3D structure (3) extending over a top surface

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of the device (6), applying a casting compound (29) over the top surface of the device (see Fig. 20) and reducing a thickness of the casting compound so that the connection area protrudes through the casting compound (29); and after applying a casting compound, electrically coupling the connection area to a terminal (12) of a second apparatus (e.g., a circuit board 10, Figs. 20-21) by soldering (Col. 13, lines 32+).

Regarding claims 4, 21 and 23-26, Haimerl et al. further disclose the method, as described above, being applied to a plurality of semiconductor devices formed from a semiconductor wafer (Col. 10, lines 7+, Col. 13, lines 50+)

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Haimerl et al. (6,897,568) in view of Chakravorty (6,181,569 of record).

Regarding claim 3, Ohuchi et al. disclose the claimed invention as detailed above except for teaching the device package (12) electrically connected to a lead frame (Haimerl et al. do teach the device package electrically connected to the circuit board as detailed above).

Chakravorty while related to a similar Chip-sized-package design teach the external bump electrodes of the device package being electrically connected to printed circuit board or lead frame for the device package functioning as intended (Col. 1, lines 12+). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to select the

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second apparatus such as a lead frame, instead of a circuit board, for the device package of Ohuchi et al. electrically connected to since selecting a certain second apparatus (e.g., a circuit board or a lead frame) for a device package, such as the one taught by Haimerl et al., to electrically connected to, is held to be within the ordinary designing ability expected of a person skilled in the art and that has been taught by Chakravorty.

5. Claims 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haimerl et al. (6,897,568) in view of Hsieh et al. (6,790,758 of record).

Regarding claims 14-17, Haimerl et al. disclose the claimed invention as detailed above except for teaching the casting compound comprises silicon-based material, thermoplastic material or epoxy resin.

Hsieh et al. while related to a similar method of forming a module teach (see specifically figure 2F) dispensing a casting compound (212) over the top surface of the device (200) (figures 2F, 2G) so that the connection area (210) protrudes through the casting compound (212), wherein the casting compound comprises silicon-based material, thermoplastic material or epoxy resin (Col. 3, lines 49+); electrically coupling the connection area (210) to a terminal (306) of a second apparatus (e.g., a substrate 300, see figure 3, or a printed circuit board 106, see figure 1, Col. 1, lines 44+ and lines 59+). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to apply silicon-based material, thermoplastic material or epoxy resin as the casting compound in the module manufacturing by Haimerl et al.'s method since such materials are commonly used in the art as a casting compound formed on the active surface of a semiconductor chip or die, as taught by Hsieh et al.

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6. Claims 8-10 and 12, insofar as being indefinite, are rejected under 35 U.S.C. 103(a) as being unpatentable over Haimerl et al. (6,897,568) in view of Ha et al. (6,339,251 of record).

Regarding claims 8-10, Haimerl et al. disclose the claimed invention as detailed above except for teaching separation corridors or scribe lines exposed between the chips by a photolithographic process.

Using a photolithographic process to expose the separation corridors or the scribe lines on the wafer before dicing the wafer is commonly applied in semiconductor art as disclosed by Ha et al. (Col. 4, lines 14+). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to applied the photolithographic process in combination with the method of Haimerl et al. in order to expose the separation corridors or the scribe lines on the wafer between the chip in order to simplify the dicing step as taught by Ha et al.

Regarding claim 12, although the proposed method of Haimerl et al. and Ha et al. does not explicitly teach the wafer being cooled to a temperature at which the casting compound is adequately brittle before separating the wafer into a plurality of individual chips, such limitation is considered as to be obvious during the process of separating the into a plurality of individual chips and it is held to be within the ordinary designing ability expected of a person skilled in the art.

7. Claims 11 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haimerl et al. (6,897,568) and Ha et al. (6,339,251 of record) as applied to claims 8-9 above and further in view of Glenn et al. (6,420,776 of record).

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Regarding claims 11 and 27, the proposed method of Haimerl et al. and Ha et al. discloses the limitations of the invention as detailed above except for a laser beam being used to expose the separation corridors or the scribe lines.

Using a laser beam to expose the separation corridors or the scribe lines on the wafer is commonly applied in semiconductor art as disclosed by Glenn et al. (Col. 5, lines 59+, Col. 7, lines 4+, Col. 8, lines 47+, Col. 10, lines 30+). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to applied the laser beam to the method of Ohuchi et al. in order to expose the separation corridors or the scribe lines on the wafer since laser beam is commonly applied in the art to expose the scribe lines as taught by Glenn et al.

8. Claims 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haimerl et al. (6,897,568) in view of Hiatt et al. (6,673,649 of record).

Regarding claims 19-20, Haimerl et al. disclose the claimed invention as detailed above except for a process of reducing the thickness of the casting compound (e.g., thermal removal (claim 19) and etching (claim 20)).

Thermal removal and etching are common processes in semiconductor art for reducing the thickness of a layer as disclosed by Hiatt et al. (Col. 5, lines 66+ and Col. 6, lines 2+). It would have been obvious to a person of ordinary skill in the art at the time the invention was made to applied thermal removal or etching process for reducing the thickness of the casting compound in Haimerl et al.'s device since such processes are commonly used in the art as taught by Hiatt et al.

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8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luan Thai whose telephone number is 571-272-1935. The examiner can normally be reached on 8:00 AM - 4:30 PM, Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bradley W. Baumeister can be reached on 571-272-1722. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Luan Thai

Primary Examiner

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September 19, 2006